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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,616	11/28/2000	Michael L. Ziegler	10001161-1	8427

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EXAMINER

NAHAR, QAMRUN

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 11/13/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/724,616

Applicant(s)

ZIEGLER ET AL

Examiner

Qamrun Nahar

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5 and 9-11 is/are rejected.
- 7) ☒ Claim(s) 2-4, 6-8 and 12-14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This action is in response to the amendment filed on 9/2/03.
2. The rejection under 35 U.S.C. 112, second paragraph, to claim 10 is withdrawn in view of applicant's amendment.
3. The rejection under 35 U.S.C. 103(a) to claims 2-4 and 6-8 are withdrawn in view of applicant's arguments.
4. Claims 12-14 have been added.
5. Claim 10 has been amended.
6. Claims 1-14 are pending.
7. Claims 2-4, 6-8 and 12-14 are objected to.
8. Claims 1 and 9 stand finally rejected under 35 U.S.C. 102(e) as being anticipated by Tsai (U.S. 6,161,196).
9. Claims 5, 10 and 11 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai (U.S. 6,161,196) in view of Fuchs (U.S. 5,590,277).

### ***Response to Amendment***

#### ***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsai (U.S. 6,161,196).

**Per Claim 1:**

The Tsai patent discloses:

- **a computer-implemented method for software error recovery** ("The invention provides a general error detection and recovery technique that ensures data integrity for critical data without the need for any modification of source code or executable code, while also providing a high degree of automation and transparency for fault-tolerant configuration and operation." in column 2, lines 32-37)

- **compiling program source code into a first set of object code with a first compiler; compiling the program source code into a second set of object code with a second compiler** ("Error detection in the FIG. 7 embodiment is accomplished via replication of a given target program on three different machines, with each copy of the target program controlled by one of the separate backends 28-i on one of the three machines. These backends communicate with the single frontend 100, which serves as a coordinator for the backends 28-i and is operative to determine discrepancies among the different copies of the target program as the copies execute." in column 8, lines 19-29; column 7, lines 1-39; and see Fig. 6, item "GDB"; each backend inherently compiles the program source code into respective object code; each backend contains a GDB, which is a debugger that uses the information generated by GCC, which is a compiler.

Art Unit: 2124

Therefore, each backend inherently contains a GCC, a compiler, for the GBD, the debugger, to work.)

- identifying checkpoints in the first and second sets of object code, each checkpoint in the first set of object code corresponding to a checkpoint in the second set of object code; associating sets of data objects with the checkpoints; automatically generating executable checkpoint code for execution at the checkpoints, the checkpoint code configured to store state information of the associated data objects for recovery if execution of the program is interrupted (“In operation, each of the copies of the target program may be temporarily stopped at the beginning of the first program instruction. At that point, the user selects the desired voting parameters, e.g. variables to be voted upon and voting times, and recovery parameters, using a creation GUI of the frontend 100. ... only a subset of these or other similar parameters are specified by the user. The frontend 100 then sends the corresponding commands to each of the backends 28-i. The frontend creation GUI described above may be modified in a straightforward manner to allow this user specification of the voting parameters and recovery parameters. When the appropriate breakpoints have been inserted by the backends 28-i, the execution of all copies of the target program is resumed. For each breakpoint, each backend 28-i will report the value of preselected critical variables to the frontend 100. If the frontend 100 finds that all reported values are identical, then it instructs each backend 28-i to continue execution of its copy of the target program.” in column 8, lines 30-48)

- executing the first set of object code; storing the state information in executing the checkpoint code; and upon detecting an error in execution of the first set of object code, resuming execution of the program using the second set of object code ("FIG. 8 illustrates a situation in which the frontend 100 detects a divergence in the reported values from the backends 28-i. The backend with the minority value is identified as the erroneous backend, and execution of the target program is terminated on the corresponding machine. The erroneous backend in this example is backend2 (28-2). A checkpoint is then taken from one of the non-erroneous backends, e.g., backend 1 (28-1), and that checkpoint data is copied to the machine with the erroneous backend, i.e., backend2 (28-2), and a new target program is initiated on backend2 using the checkpoint data." in column 8, lines 49-61; execution of the program is resumed using the checkpoint data of the non-erroneous backend, e.g., backend 1 (28-1). That is, execution is resumed using the second set of object code of backend 1 (28-1), where each backend inherently contains its own compiler.).

**Per Claim 9:**

This is an apparatus version of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also anticipated by Tsai.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2124

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 5, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai (U.S. 6,161,196) in view of Fuchs (U.S. 5,590,277).

**Per Claim 5:**

Tsai teaches a computer-implemented method for software error recovery ("The invention provides a general error detection and recovery technique that ensures data integrity for critical data without the need for any modification of source code or executable code, while also providing a high degree of automation and transparency for fault-tolerant configuration and operation." in column 2, lines 32-37); compiling program source code into a first set of object code with a first compiler; compiling the program source code into a second set of object code with a second compiler ("Error detection in the FIG. 7 embodiment is accomplished via replication of a given target program on three different machines, with each copy of the target program controlled by one of the separate backends 28-i on one of the three machines. These backends communicate with the single frontend 100, which serves as a coordinator for the backends 28-i and is operative to determine discrepancies among the different copies of the target program as the copies execute." in column 8, lines 19-29, each backend inherently compiles the program source code into respective object code); identifying checkpoints in the first and second sets of object code, each checkpoint in the first set of object code corresponding to a checkpoint in the second set of object code; associating sets of data objects with the checkpoints; automatically generating executable checkpoint code for execution at the

Art Unit: 2124

checkpoints, the checkpoint code configured to store state information of the associated data objects for recovery if execution of the program is interrupted ("In operation, each of the copies of the target program may be temporarily stopped at the beginning of the first program instruction. At that point, the user selects the desired voting parameters, e.g. variables to be voted upon and voting times, and recovery parameters, using a creation GUI of the frontend 100. ... only a subset of these or other similar parameters are specified by the user. The frontend 100 then sends the corresponding commands to each of the backends 28-i. The frontend creation GUI described above may be modified in a straightforward manner to allow this user specification of the voting parameters and recovery parameters. When the appropriate breakpoints have been inserted by the backends 28-i, the execution of all copies of the target program is resumed. For each breakpoint, each backend 28-i will report the value of preselected critical variables to the frontend 100. If the frontend 100 finds that all reported values are identical, then it instructs each backend 28-i to continue execution of its copy of the target program." in column 8, lines 30-48); executing the first set of object code; storing the state information in executing the checkpoint code; and upon detecting an error in execution of the first set of object code, selecting the second set of object code in resuming execution of the program ("FIG. 8 illustrates a situation in which the frontend 100 detects a divergence in the reported values from the backends 28-i. The backend with the minority value is identified as the erroneous backend, and execution of the target program is terminated on the corresponding machine. The erroneous backend in this example is backend2 (28-2). A checkpoint is then taken from one of the non-erroneous backends, e.g., backend 1 (28-1), and that checkpoint data is copied to the machine with the erroneous backend, i.e., backend2 (28-2), and a new target



Art Unit: 2124

program is initiated on backend2 using the checkpoint data.” in column 8, lines 49-61). Tsai does not explicitly teach selecting the first set of object code in resuming execution of the program. Fuchs teaches selecting the first set of object code in resuming execution of the program (column 15, lines 48-67 to column 16, lines 1-10).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Tsai to include selecting the first set of object code in resuming execution of the program using the teaching of Fuchs. The modification would be obvious because one of ordinary skill in the art would be motivated to debug the faulty program, that is, to recover the faulty program.

**Per Claim 10 (Amended):**

This is an apparatus version of the claimed method discussed above, claim 5, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

**Per Claim 11:**

This is a computer program product version of the claimed method discussed above, claim 5, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

***Allowable Subject Matter***

14. Claims 2-4, 6-8 and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

15. Applicant's arguments with respect to claims 1, 5 and 9-11 have been fully considered but they are not persuasive.

*In the remarks, the applicant argues that:*

a) For example, the Office Action is mistaken in alleging that "each backend inherently compiles the program source code into respective; object code." The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rifcluzert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" In re Robertson, 169 F.3d 743, 745, 49 TJSPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex pane Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original) (MPEP

Art Unit: 2124

2112). The Office Action fails to show that each backend necessarily compiles the program source code into respective object code. For example, the Office Action fails to establish that Tsai does not implement an alternative in which only one compiler is used to generate object code and copies of the object code are installed and run on the Tsai's various backends.

Furthermore, Tsai's description appears to suggest that copies of a program are run (col. 9, l. 64 - col. 10, l. 8), in which case each copy is from a single compiler.

The claims include further limitations that relate to resuming execution of the program using the second set of object code upon detecting an error in execution of the first set of object code. The Office Actions does not show that these limitations are identically shown in Tai's col. 8, l. 49-61. As this section of Tsai clearly states, the target program on the machine with the erroneous backend is terminated and a new target program is initiated on the machine using checkpoint data. As Tsai later explains, the newly started program is not from a second compiler. Tsai's newly started program is simply a copy of the target program (col. 9, l. 64 - col. 10, l. 8). Thus, Tsai does not resume execution using a second set of object code as claimed.

*Examiner's response:*

a) Examiner strongly disagrees with applicant's assertion that Tsai fails to disclose the claimed limitations recited in claim 1. Tsai clearly shows each and every limitation in claim 1. As previously pointed out in Paper No. 3, Tsai discloses compiling program source code into a first set of object code with a first compiler; compiling the program source code into a second set of object code with a second compiler (column 8, lines 19-29; column 7, lines 1-39; and see Fig. 6, item "GDB"; each backend inherently compiles the program source code into respective

Art Unit: 2124

object code; each backend contains a GDB, which is a debugger that uses the information generated by GCC, which is a compiler. Therefore, each backend inherently contains a GCC, a compiler, for the GDB, the debugger, to work.).

Furthermore, as previously pointed out in Paper No. 3, Tsai discloses upon detecting an error in execution of the first set of object code, resuming execution of the program using the second set of object code (column 8, lines 49-61; execution of the program is resumed using the checkpoint data of the non-erroneous backend, e.g., backend 1 (28-1). That is, execution is resumed using the second set of object code of backend 1 (28-1), where each backend inherently contains its own compiler.).

In addition, see the rejection above in paragraph 11 for rejection to claim 1.

*In the remarks, the applicant argues that:*

b) Claim 5 includes the limitations of claim 1 and further specifies selecting between the first and second sets of object code in resuming execution. The Office Action fails to show a teaching of these limitations by either Tsai or Fuchs. The apparent reasoning provided in the Office Action is, "Fuchs teaches selecting the first set of object code in resuming execution of the program (column 15, lines 48-67 to column 16, lines i-10)." The alleged motivation states, "It would have been obvious ... to modify the method disclosed by Tsai to include selecting the first set of object code in resuming, execution of the program using the teaching of Fuchs [because] one of ordinary skill in the art would be motivated to debug the faulty program." It is respectfully submitted that the Office Action appears to ignore the claimed aspect of selecting between the first and second sets of object code. No evidence is provided from either reference to suggest that

Art Unit: 2124

both a first and a second set of object code are considered in making a selection. Furthermore, the Office Action fails to provide evidence that shows either Tsai or Fuchs teaches first and second sets of object code as claimed. The alleged motivation is also conclusory and improper. Therefore, prima facie obviousness is not established for claim 5.

*Examiner's response:*

b) Examiner strongly disagrees with applicant's assertion that the combination of Tsai and Fuchs fails to disclose the claimed limitations recited in claim 5. The combination of Tsai and Fuchs clearly shows each and every limitation in claim 5. As previously pointed out in Paper No. 3, the combination of Tsai and Fuchs teaches selecting between the first set of object code and the second set of object code in resuming execution of the program. Tsai is relied upon for the limitation "selecting the second set of object code in resuming execution of the program" (Tsai, column 8, lines 49-61) and wherein Fuchs is relied upon for the limitation "selecting the first set of object code in resuming execution of the program" (Fuchs, column 15, lines 48-67 to column 16, lines 1-10).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Tsai to include selecting the first set of object code in resuming execution of the program using the teaching of Fuchs. The modification would be obvious because one of ordinary skill in the art would be motivated to debug the faulty program, that is, to recover the faulty program.

In addition, see the rejection above in paragraph 13 for rejection to claim 5.

Art Unit: 2124

16. Applicant's arguments, see Remarks, page 7, par. 3, filed 9/2/03, with respect to claims 2-4 and 6-8 have been fully considered and are persuasive. The rejection of claims 2-4 and 6-8 has been withdrawn.

***Conclusion***

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

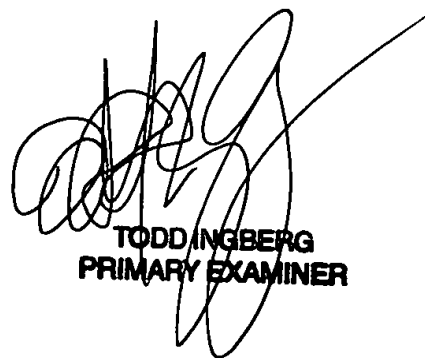
18. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

Art Unit: 2124

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

QN  
November 12, 2003



**TODD INGBERG**  
**PRIMARY EXAMINER**